Volume 8 September, 1922 *Number 9*

Lubrication

A Technical Publication Devoted to the Selection and Use of Lubricants

THIS ISSUE

PUBLISHED MONTHLY BY
THE TEXAS COMPANY, U.S.A.
TEXACO PETROLEUM PRODUCTS

TEXACO LUBRICANTS *for* LAUNDRY MACHINERY

A SUGGESTIVE LIST

giving recommendations for the various parts of the most commonly used types of machinery

Washing Machines:

Main Bearings, Shaft Bearings, Float and Reversing Mechanisms	Texaco Aleph Oil or No. 1 Cup Grease where the machine is designed for grease lubrication.
Gears	Texaco Crater Compound No. 1
Reversible Header Ball Bearings	Texaco Petrolatum or Texaco No. 1 Cup Grease

Extractors:

Upper and Lower Spindle Bearings, Driving Pulley Bearings and other wearing parts	Texaco Aleph Oil, or on machines fitted for grease cup lubrication, Texaco No. 1 Cup Grease

Tumblers ..... Lubrication is similar to Washing Machines.

Flatwork Ironers:

Main Bearings	Texaco Pinnacle Mineral Cylinder Oil, or, if grease lubrication is desired, Texaco No. 1 Cup Grease
Gears	Texaco Crater Compound No. 2
Other wearing parts	Texaco Aleph Oil

Miscellaneous Machinery:

Including Dryers, Starch Mixers, Collar Ironers, Other Specialty Ironers, Presses, Dampeners, Starchers, Collar Shapers, Collar Moulders, etc.:

For Motor Shaft Bearings and other wearing parts	Texaco Aleph Oil
Gears	Texaco Crater Compound No. 1 or 2
Cam Lubrication	Texaco Crater Compound No. 1

NOTE: If the grade of oil to use for any specific part or machine is not covered in the above list, kindly call on us and we shall be glad to tell you the right oil to use.

If any of your machinery is operating under unusual conditions which require individual treatment, let us know the name of the manufacturer, the type of machine, the general operating conditions, and we shall be glad to advise you as to the right Texaco Lubricant which will give you the best possible service.

LUBRICATION

A Technical Publication Devoted to the Selection and Use of Lubricants

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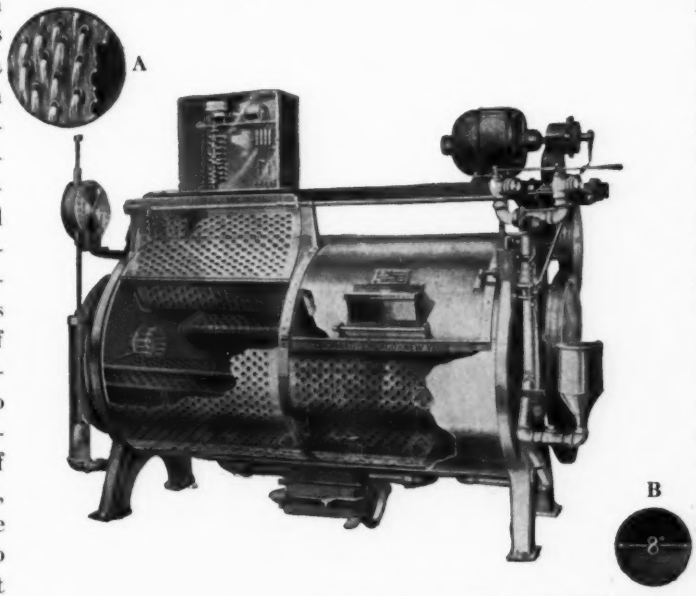
The Lubrication of Laundry Machinery

WITH the rapid increase in the number of steam laundries in operation, and their ever-advancing popularity, the production of laundry machinery, in general, has reached such a proportion as to demand a distinct place in the field of mechanical and lubricating engineering, and their care, upkeep and lubrication are factors that should be of more than passing interest to everybody. Except in homes of the old school, the day of the hand wash-tub has passed. It is the opinion of many authorities that all things considered the mechanical laundering and finishing of clothing and household linens are more economical when handled in bulk by a skilled corps of workers equipped with the most modern appliances than when carried out independently in each home.



Courtesy of The American Laundry Machinery Co.

Fig. 1.—Modern Cascade Washer. Phantom view showing details of construction. Note the patent "double embossed" perforations in the cylinder, the perforated ribs which prevent tangling and give the necessary drop to the clothes, operating mechanism and float water level device. Rapid filling and emptying are assured by extra large inlets and outlets as shown.

A—"Close up" of section of Perforated Cylinder.
B—The Outlet Valve is Equivalent to an 8-inch Pipe.

Steam laundering machinery involves to a large extent problems of specialized design. Such apparatus has been developed by the manufacturers purely from their own experience and experiments. As a general rule, constructional features of each type of machine will be very similar in most respects depending on the purpose for which installed—that is, to properly wash, dry and iron the various articles of apparel, etc., that must be handled. The greatest care must be exercised in the handling of each individual

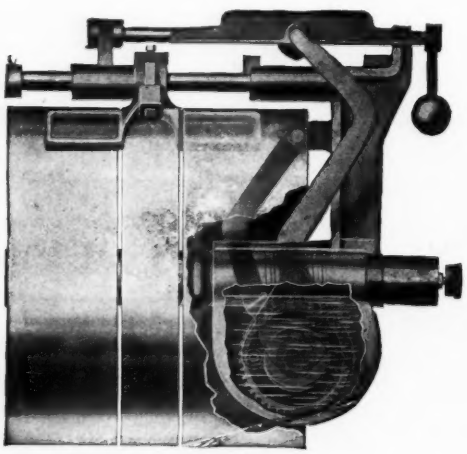
piece to avoid tearing, staining or mutilation. One of the most important factors in this connection is correct lubrication.

In bulk laundry practice today we have primarily to deal with two main steps: *i. e.*, (1) Washing or cleansing, and (2) Finishing. In many cases the former is a class of laundry work in itself. The so-called "finished laundry," on the other hand involves both steps. Such a plant requires the greatest variety of machinery due to the type of goods handled, which may vary all the way from overalls, etc., to the finest laces and lingerie. It is with such machines that the lubricating engineer will most usually have to deal, and where the service demanded of the lubricants will be most exacting.

WASH ROOM EQUIPMENT

Washing Machines

The washing machine forms the first step in modern steam laundry practice. Essentially its purpose is to wash, rinse (and in some cases starch, bleach, and blue) the clothing which has been properly marked, tagged or netted; or in certain types of machines the clothes may be placed in individual compartments. The washing is accomplished by rotation of a perforated inner cylinder, which is fitted with special perforated ribs extending radially. These, it is claimed, insure clothing getting the necessary drop, and increase the rapidity of the washing process.



Courtesy of The American Laundry Machinery Co.

Fig. 2.—Oil Header for Acme Type Washer. Note that all parts subject to any appreciable wear, operate continuously in oil.

In construction the washer consists of a water-tight outer casing which may be of wood, brass, monel metal or galvanized iron. Within this outer casing is fitted the perforated inner cylinder, which may be of wood, brass, galvanized sheet iron, monel metal or phosphor bronze, consisting either of one large compartment or individual compartments as desired. Operation is based on the principle of rotary motion, periodically reversed, in order to insure thorough agitation of contents with the cleansing solution, and prevent tangling of garments. Rotation of the inner cylinder is accomplished by a suitable mechanism, equipped for reversing, automatic starting and stopping. Driving mechanism may be of the independent or central motor type (via suitable shafting, etc.) the washer being belt connected or designed to use direct gearing. Large type machines have a driving connection at both ends. On smaller installations, however, one end drive is sufficient.

Suitable inlets and outlets are installed for filling and emptying, and are operated by a timing mechanism. Such valves as desired are located usually below the casing. The steam inlet likewise is installed at the lower part of the outer casing. In modern practice, to insure against discoloration, clothes are separated and washed in batches according to type, color, and grade. Overloading of the machine is cautioned against, as washing will not be complete. Excess chemicals should never be used to aid the natural process.

Net washing is considered most suitable today. When clothes are washed loose, frequently they are torn in removal from the machine, or strained so as to go to pieces prematurely. It is claimed by authorities that this seldom happens when nets are used. The

net takes all the strain, and to remove from the machine it is simply a case of reaching in and lifting each net and its contents out bodily. As a result, in general, nets insure best prospects of freedom from lost clothes or mistakes, etc., and promote durability and wearability of clothes.

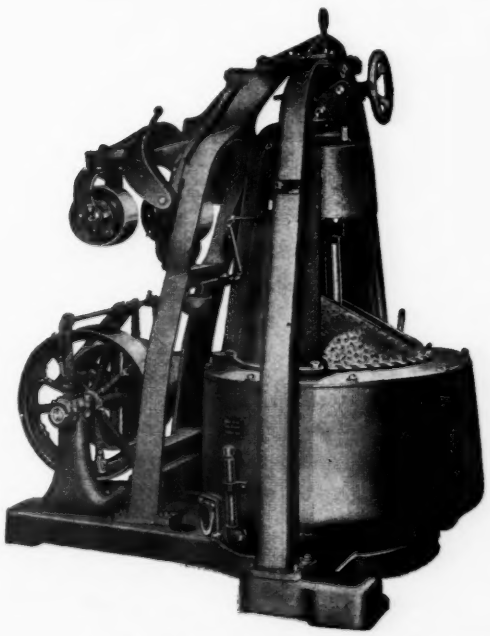
Courtesy of Troy Laundry Machinery Co., Ltd.

Fig. 3.—Type of Solid Curb Underdriven Extractor, with safety cover and push button automatic starter. When the cover is raised the push button circuit is open, which prevents the machine from being started. The cover must be brought down to complete the circuit before the extractor can be put in motion. In addition, the cover can not be raised while the basket is in motion.

Extractors

When the clothes have been suitably washed, rinsed, bleached or blued, (and starched if necessary) in the washer, the next step is to transfer them to the extractor or centrifuge. The purpose of this machine is to dry the pieces as much as possible, extracting the water by utilization of the principles of centrifugal force. As most usually constructed an extractor consists of a cast iron or wrought steel outer casing containing a perforated cylindrical metal basket fitted to a vertical shaft which is suitably arranged for belt drive either from overhead or below. Upon rapid rotation of this basket the clothes are forced tightly against the side of the basket, the water being pressed out through the perforations, to drip to the bottom of the outer casing and thence pass to the drain. General practice in extractor construction is to install safety covers whereby it is impossible to start the machine with the cover raised, or to raise same while the basket is in motion. A locking brake and an adjustable friction clutch are other accessories which are recommended both for the safety of the operator and the machine, and to obviate sudden straining of the clothes as much as possible, which violent starting or stopping might promote.

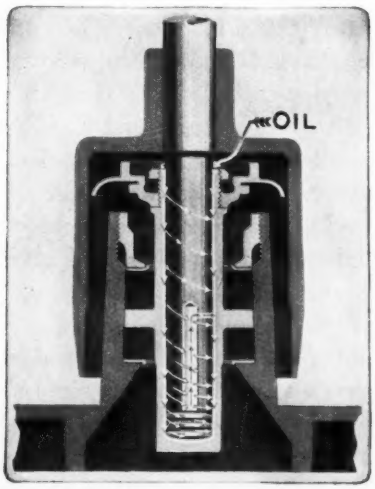
Extractors are driven almost entirely by belts, operated either from the same shaft as the washer, or independently. Overhead drive extractors have come into prominence in many instances where it is desired to handle heavy loads and where excessive vibration in the base



Courtesy of The American Laundry Machinery Co.

Fig. 4.—Overdriven Extractor with Angle Countershaft, showing belt, tightener and safety cover. Note that the basket, spindle, driving pulley and curb (or outer casing) swing like a bell from the apex of the tripod, being secured to the latter by a heavy universal joint. Upper and lower spindle bearings in this machine are self-oiling and provided with oil drips.

or lower parts has been an objection, such as in service on other than ground floors of buildings. A well-known manufacturer constructs the basket driving mechanism and outer casing to swing from the apex of a tripod by a universal joint. Oscillation of the basket within the curb or outer casing is prevented by bearings at the upper and lower ends of the main spindle, the lower bearing being in the bottom of the curb.



Courtesy of The American Laundry Machinery Co.

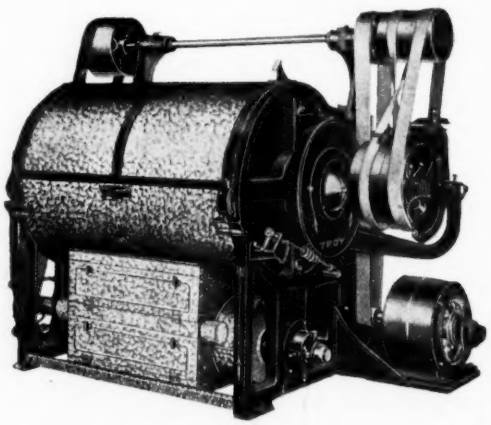
Fig. 5.—Sectional View showing Automatic Spindle Oiling Device for Underdriven Type of Extractor. Oil flow to the base of the spindle is indicated by arrows, and smooth running with a minimum of vibration is assured by perfect lubrication at all times.

Starch Extractors

To promote efficiency and rapidity of operation, enable ironing to be done with less heat, reduce wear and tear on the clothes, insure even distribution of starch throughout them, and give a better finish, etc., in modern laundry practice starch extractors are becoming a necessity. These machines are constructed and operated very similarly to the regular water extractor, employing the principles of centrifugal force to extract excess starch and moisture.

Clothes and Dry Room Tumblers

After suitable drying in the extractors, prior to passage to the various finishing ironers, etc., it is frequently desirable to loosen the goods so that they may be readily and rapidly separated without injury and have the lint shaken out; or in the case of rough dry laundry, to rapidly dry the pieces by extensive agitation under high temperatures. For such purposes the clothes tumbler is in use. In construction the tumbler is quite similar to the washer, consisting essentially of a wood or metal outer casing, a perforated wooden or metallic revolving inner cylinder, and the driving mechanism, the latter being installed generally at one end only. Modern construction leans toward reversible rotation of this inner cylinder, the same as for the washer, it being considered that less power is used and better aeration and loosening of the goods result. In the handling of stiff collars tumblers are especially useful, as they remove lint effectively, and open the fabric so as to afford uniform starch penetration and reduce subsequent wiping by hand. Loading of tumblers is carried out from the front; unloading may be done from the same opening, or in certain types of machines from underneath the outer casing directly into a special receiver.



Courtesy of Troy Laundry Machinery Co., Ltd.

Fig. 6.—Type of Small Dryroom Tumbler. This machine combines the principles of the tumbler and dryroom in order to give rapid, but inexpensive drying. The goods are dried by air which is taken in by means of two fans at the bottom of the machine, entering through screened openings and discharging, after being heated by a steam coil, through and over the goods contained in the cylinder.

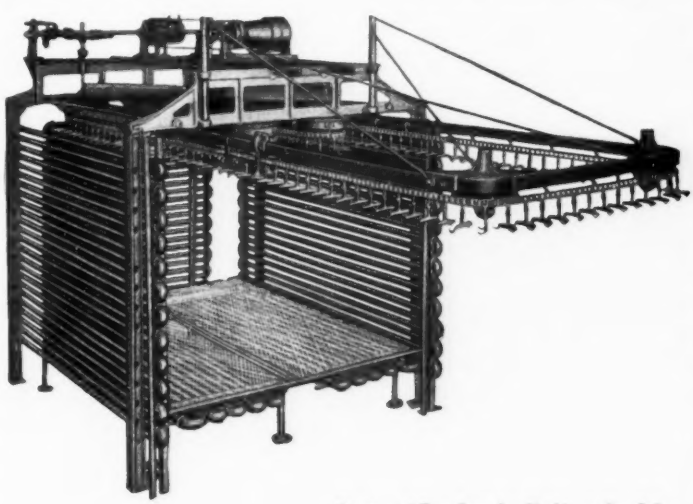
When tumblers are used for rough drying purposes they are usually equipped with steam heating coils and special air ventilating devices to insure as rapid drying as possible and the free circulation and escape of saturated hot air and lint from the machine.

LUBRICATION OF WASH ROOM MACHINERY

In the lubrication of such equipment no especially difficult problems will arise except on the washing machine bearings where the danger of high water and consequently sluicing out of the lubricant, or the presence of alkali, etc., will be prevalent.

Washing Machines

Lubrication of such machinery is necessary on the main bearings, driving gears, shaft bearings, float mechanism and reversing mechanism. Main bearings should preferably be lubricated with a relatively heavy mineral oil of about 300″ Saybolt viscosity at 100° F., the lubricant being applied by oil cups, or simply squirted in from a can onto a bed of lamp wick packing set in the oil well. In many installations, however, grease cups are installed. The grease to use in such case should be a medium bodied compression cup grease. There is always possibility of the water level in the machine being too high, and leakage occurring to a certain extent via these bearings. The water, being of a soapy nature, lubricates somewhat, but should never be relied upon solely for this purpose. It is recommended, therefore, that the lubricant used be of sufficient body to effectively resist washing action of this water. Certain more modern types of machines may have liberal oil chambers provided in the main bearing boxes, which can be packed with hemp, etc., and fitted with removable weights.



Courtesy of Troy Laundry Machinery Co., Ltd.

Fig. 7.—Type of Self-contained Conveyor Dryroom Frame and Coils, showing variable speed cones. A special feature of this apparatus is the arrangement of coils by which the greatest heating capacity possible is obtained, and maximum driving assured.

Gear lubrication involves no difficulties. For this purpose a good grade of gear compound, of about 1000″ Saybolt viscosity at 210° F. will be very satisfactory. A certain amount of oil leakage will be prevalent, however, from the main bearings, etc., and in many plants the operators rely on this dripping onto the gears, occasionally giving the latter a shot of fresh oil. However, this is not good practice. Shaft bearings, float and reversing mechanisms should be lubricated with a medium bodied engine oil of 300″ Saybolt viscosity at 100° F. either by hand oiling or preferably by sight feed oil cups.

On certain types of machines lubrication of the driving shaft carrying the header pulleys is carried out by means of grease cups, using a good medium bodied compression cup grease. The driving end of the shaft is hollowed out in part, with suitable grease ducts cut therefrom to the outer surface, the cup being screwed in the end of the shaft. Some types have reversible headers fitted with ball bearings on which a lubricant of petrolatum nature is recommended. Other belt-driven machines have the header elevated and all the working parts subjected to wear are submerged and operate continually in oil.

Extractors

The lubrication of extractors is confined to the vertical spindle bearings and such driving mechanism as is employed. Under-driven machines require lubrication of the bottom of the spindle only. This is best accomplished by use of a special spindle oiling device where free circulation of the oil is possible. On an over-driven extractor both the upper and lower spindle bearings are generally designed for self oiling, being fitted with suitable oil drips. The

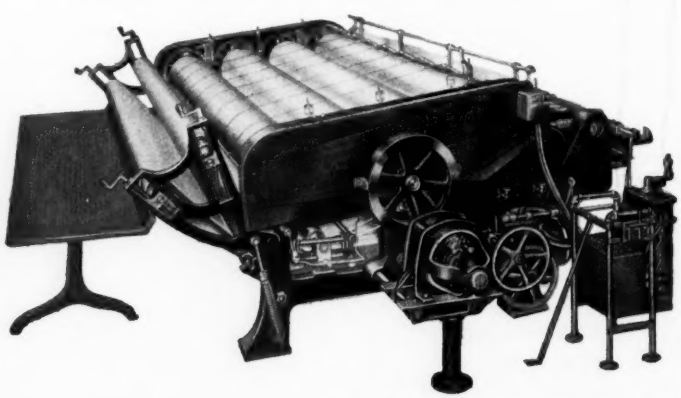
upper bearing will require the most attention and it should be equipped with a form of saturated wick lubrication, to insure positive and continuous oiling, the wick being held in the oil reservoir around the spindle by a movable metal ring. The bottom bearing carries an oil well with filling pipe attachment. On such bearings a good engine oil of about 300″ Saybolt viscosity at 100° F. gives excellent results. Other parts requiring lubrication are the driving pulley bearings, the supporting pivots (for an over-drive machine) safety cover hinges, lifting mechanism, and motor bearings, etc. The same grade of oil will be found adaptable for all these and any other minor wearing parts. In some machines grease lubrication will be called for on certain of these parts, such as the pulley bearings. In such cases a good medium bodied compression cup grease will be suitable.

FINISHING EQUIPMENT

Ironers

The process of finishing clothes involves a number of more or less intricate machines, depending on the type of goods to be handled. With the exception of collar dampeners, starchers and shapers, they all embody the ironing or pressing idea. The flat work ironer is the chief machine of this class, there being two general types, the shoe and the cylinder. As most usually constructed it consists of one or more padded rolls of about 12 inches in diameter and 8 to 10 feet long, revolving in conjunction with concave steam heated shoes or chests, goods being carried through the machine by suitable aprons. Pieces as discharged may either be fed back to the operator, as is the practice on smaller single roll machines, or else deposited at the opposite end of the machine for subsequent folding, etc. To give a finish to the reverse side of the goods the steam chest for the last roll is inverted in certain types of ironers. Modern practice is leading towards machines which will iron on both sides of the goods. Thereby uniformity of pressure is gained, tails, string marks and other defects or imperfections on the ironed surfaces are eliminated, and the finished goods are given a practically faultless appearance. The purpose of using a multi-roller machine is to speed up rate of operation and still obtain a practically bone dry finish at one rolling. Using a single roller machine the rate of rolling must be carefully regulated in accordance with the size and extent of dampness of the goods, and the steam temperature available. It is considered poor operation to have to re-iron any piece due to incomplete drying. Driving of flat work ironers may be either accomplished by belt connection from the driving motor or directly by motor-driven gearing, reduced as requisite.

When a soft lustrous finish is desired certain types of flat work ironers are built with one or two large cylinders (of 3 to 4 feet in diameter, and about 10 to 12 feet long). The steam is fed directly to the cylinders at full boiler pressure (about 100 lbs. per square inch) through hollow shafting at one end. Sealing is effected by use of stuffing boxes. Condensate passes out through a similar hollow shaft at the other end. To augment the capacity of the machine and gain increased heating surface under pressure, usually from 5 to 8 padded rolls (of about 8″ diameter) are installed to press on the upper surface of the main cylinder. Padded rolls on certain machines are constructed with an automatic raising device whereby they may be easily and



Courtesy of Troy Laundry Machinery Co., Ltd.

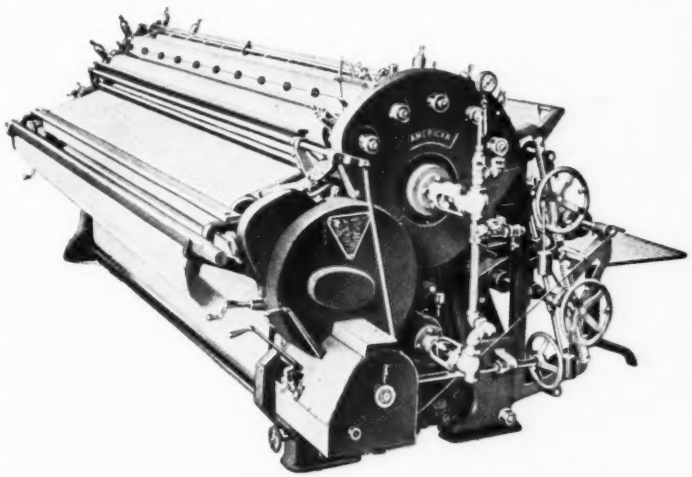
Fig. 8.—Typical Four Roll Flat Work Ironer. This machine will iron flat work dry, at one passage, at a speed of forty feet per minute. It is fitted with an automatic ribbon feed and patent safety stop. Gears are also covered to prevent injury to operator. Lubrication by sight feed oil cups is customary, as indicated.

quickly lifted from contact with the main cylinder. Pressure of these rolls can be regulated (according to an indicator) as desired.

Safety devices are an important feature on all types of ironers. Usually finger guards are installed on all machines which automatically and instantly stop the machine if very light pressure is applied. Pressing machines are built with cage guards and start automatically with the lowering of the guard, stopping instantly when it is lifted.

Collar and Cuff Starchers

The necessity of treating such goods with a greater amount of starch than any other type of clothes, has caused the introduction of a machine especially built for this purpose. A standard make consists of one or more large brass drums suitably covered with starcher felt and cheese cloth, and designed to rotate in contact with a series of corrugated brass rolls, the rolls and lower part of the drums being immersed in a pan of starch solution. In operation the pieces to be starched are fed onto a carrying apron and led through the solution between the rolls and drum. Pressure as desired between these is attained by adjusting springs, whereby the extent of starching can be controlled. On leaving the solution the goods pass between suitable rolls which wipe and remove excess starch. Operation of the machine is carried out by gears attached to the drum shafts, meshing with suitable worms, the shaft of which is belt driven from either an independent motor or a central driving shaft. Other types of starching devices are the Dip Wheel, and Barrel Collar Starchers, Shirt Bosom Starchers, Wristband Starchers, and Cylinder Starchers for semi-stiff goods such as ladies' dresses, flat work, etc. While the above differ widely in construction, essentially they embody the same principle of impregnating the goods with starch under adjustable pressure. Operation is carried out by motor power through direct gear reduction or belt drive.



Courtesy of The American Laundry Machinery Co.

Fig 9.—Monitor Type Flat Work Ironer. General construction consists of two steam heated cylinders operating in conjunction with five padded rolls and two canvas aprons that hold the goods in contact with the heating cylinders. Lubrication is carried out by means of sight feed oil cups, as shown. Pressure on the padded rolls can be regulated instantly or entirely removed, as desired. This pressure is shown by an indicator on the machine.

Clothes Drying

In modern practice it is essential that certain types of starched goods, such as collars, cuffs, shirts, etc., be thoroughly dried prior to finishing. For this purpose conveyor dry rooms are a frequent installation. The latter are also often used for rough-dry laundry in place of a rotary drying tumbler. In brief, this equipment consists of a steam-heated compartment built either of wood or galvanized iron. Within this, the conveyor chain is designed to pass around suitable guides, the latter being driven from the exterior top of the compartment by bevel gearing controlled from a variable speed (usually 3 speeds furnished) countershaft which may either be belt-connected to a main operating shaft or run via reduction gearing from a small motor. From the conveyor chain are suspended the clothes hooks. As the goods are carried round and round within the compartment they are all subjected to a constant temperature which is maintained (and the heat equalized) by arrangements of steam coils and draft fans.

Dampeners

To satisfactorily dampen stiff starched goods prior to final ironing, it is essential that this be

carried out quickly and uniformly. Three types of machines have, as a result, been devised to serve this purpose: i. e. the roller type, the vapor dampener, and press type. The roller dampener may use either a system of rolls or a traveling apron. As generally constructed the former involves a pair of water conveyor rolls operating in suitable pans wherein the water level is automatically maintained

Courtesy of Troy Laundry Machinery Co., Ltd.

Fig. 10.—Type of Steam Heated Garment Press. This machine operates by a simple toggle and lever mechanism, which will lock while the toggle joint is "on center." Jar and rebound are eliminated entirely.

constant. In contact with these rolls are a pair of larger, rubber-covered rolls. Water is carried to the latter by the conveyor rolls and dampness is actually pressed into the goods as they pass between the rolls. Excess dampness is squeezed out by passing the goods between stripper rolls in contact with the rubber rolls, prior to discharge from the machine. Motive power for the rolls is via gear connection to belted pulleys, etc. In the vapor dampener the goods are treated with hot water vapor in an enclosed galvanized iron container. The water entering the machine is passed successively through an injector, which converts it to a fine mist, and a strainer prior to contact with the goods. Penetration occurs much more rapidly than when dampening is done cold, and thus greater capacity and efficiency is developed by such a machine. The press type dampener, as its name indicates, operates on the principle of pressing the moisture into the goods. It can be operated by hand, steam, air or water pressure as construction may call for.

Collar and Cuff Ironers

In principle these machines are constructed much the same as the single cylinder flat work ironer, using small padded rolls operating in conjunction with a steam heated central cylinder. Driving mechanism is also similarly designed. The number of rolls used will vary with the size and capacity of the machine.

Miscellaneous Equipment

Other types of finishing machines used in the modern steam laundry are: collar shapers, seam dampeners and shapers, art edge ironers, neck-band and wrist-band ironers, shirt body ironers, bosom ironers, cuff presses, etc. Lack of space prohibits discussion of the construction and operation of these machines in detail. In effect, however, they embody principles already considered, finishing either by roll or press, being electrically operated by suitable gear reduction, or by use of pneumatic pressure through proper arrangement of levers, etc.

LUBRICATION OF FINISHING MACHINERY

Ironers

In general the greatest difficulties in the lubrication of laundry machinery will be encountered with the large, steam heated, flatwork ironers. In the single or multi-roll type where steam chests are employed, but little direct heat is transmitted to the roll bearings, etc., or driving mechanism. On the large steam cylinder machine, however, this factor of conducted heat is a constant source of probable trouble. The bearings of this cylinder will become abnormally hot due to the continuous passage of steam and hot condensate through the hollow shafting. Though subjected to such heat the oil must be of sufficient viscosity that it will not run and get on the goods, aprons, or even drip to the floor. Careful lubrication and selection of the oil is therefore important to meet these requirements and prevent the bearings from running dangerously hot. Fortu-

nately there are no high speeds or great pressures to contend with. General good practice today is to lubricate all such bearings as are subjected to intense heat with a high viscosity pure mineral oil (i. e., about 125″ Saybolt at 210° F.). Compression cup grease is used by many operators but its action is not as positive as that of a mineral oil, since unless of the highest grade it will tend to set or coke in the grease cup under continuous heating.

Courtesy of The American Laundry Machinery Co.

Fig. 11.—Bosom Press, Belt Driven Type. The construction of this press includes two pumps, one for air and one for oil, both driven by the same piston rod. The purpose of the oil pump is to raise the padded beds up and against the steam heated chest. Pressure is automatically controlled and the pump shut off the instant it reaches a desired amount.

Lubrication of gearing should be maintained, using a high viscosity straight mineral gear oil of about 2000″ at 210° F. on the Saybolt instrument. Other external parts, and such driving mechanism as is installed can be satisfactorily lubricated with a medium bodied engine oil of 300″ Saybolt viscosity at 100° F.

Miscellaneous Equipment

Lubrication of other machinery such as clothes tumblers, dryers, starch extractors, starch mixers, collar ironers, presses, dampeners, starchers, collar shapers, collar moulders, and other small work finishing machines involves practically the same principles of operation as have been discussed above for the larger units, i. e. motor drive, by central shafting or separate motors, belt connections, gear reductions, bearings, and minor external operating mechanism. On all such bearings, shafting, pulleys and other wearing parts a good engine oil of 300″ Saybolt viscosity at 100° F. will be satisfactory. On gearing, the heavy gear lubricant stated above should be used. Specialty machines will vary considerably in construction and the means installed for lubrication, hence the engineer should study such equipment carefully and make sure he does not overlook any parts when oiling. None of these machines are high speed nor will they involve any special difficulties if the above lubricants are used and properly applied. Bearings should be lubricated at least once daily, gears about every two or three days, and enclosed gear cases and motor oil reservoirs should be cleaned and re-filled every three months.

Conclusion

The subject of laundry machinery and its lubrication has been discussed above, chiefly with a view of acquainting the reader with constructional and operating principles, as well as the necessity for proper lubrication with suitable oils. The latter has been brought out clearly in discussing the dangers of insufficient lubrication that are possible in the washing machine, due to sluicing action of the wash water through the main bearings; and in the single-roll flatwork ironer due to abnormal heating of the hollow bearings by the steam which is passed through them.

Courtesy of The American Laundry Machinery Co.

Fig. 12.—Typical Collar and Cuff Starcher. As indicated there are two brass drums covered with starcher felt and cheese cloth. The lower half of these drums is immersed in the starch solution which is kept hot at all times by a steam chest under the reservoir. Lubrication is effected by compression grease cups.

The entire subject is important to all on account of its magnitude and the extent to which it involves their pocketbooks. Few people today, outside of the laundry industry, realize the extent of the interest they possess therein. To bring this home certain statistics are in order. According to authorities the annual receipts for laundry service in the United

States approximate three hundred million dollars. It is roughly estimated that this service charge is 10% of the value of the goods. Thus the interest that the public holds in the laundry business today, or in other words the value of the goods handled, is in the neighborhood of three billion dollars.

Taking this into consideration it will be realized that efficient and economical operation of the modern laundry, and careful handling of the goods entrusted thereto, are factors of vital importance to everybody concerned.

Lubrication of Economizers

IN the operation of the modern boiler plant, the economizer and its lubrication constitute essentially one of the most important factors in the attainment of required boiler efficiency. The natural tendency of the operator is to falsely regard his economizer as relatively unimportant, due chiefly to its obscured location and the fact that it usually seems to run in a satisfactory manner regardless of the attention it receives. Care and upkeep of economizer equipment develops into a relatively small matter provided lubrication of the component parts is properly attended to; on the other hand, neglect or careless selection and use of lubricants may result in serious troubles which will materially affect plant efficiency if the economizer must be cut out of service.

The principle of the economizer is based on the utilization of otherwise waste heat, usually by the application of the "counter-current" idea, applying this heat contained in the flue gases after they have left the boiler, to heat a large volume of feed water prior to its entering the boiler. By so heating the feed water the boiler gets none of the sudden expansion and contraction due to change of temperature as when cold water is fed. Thus many leaks are avoided and the life of the boiler is prolonged.

Construction

In basic design the economizer is simply a nest of tubes built into top and bottom headers, similar to a vertical water tube boiler. The feed water is circulated within these tubes. The location of an economizer for proper results is between the boiler and stack, installed in the flue or uptake. Thus the waste gases, as they leave the boiler, pass around and between the tubes on their way to the stack, giving up considerable of their heat in passage to the water within the tubes. The exterior of each tube is kept free from soot deposit, which is a non-conductor of heat, by scrapers which travel continuously up and down the tube at slow speed, driven by a suitable mechanism. This scraper driving mechanism is the so-called heart of the installation. On its efficiency of operation rests the efficiency of the economizer and the benefits to be derived therefrom.

Lubrication

The lubrication requirements of economizers are confined solely to the scraper driving mechanism, and to the mechanical draft fan and engine if such are installed. They are not unique, nor do they involve details beyond the ability of the average boiler plant operator to handle. The problem is simply a matter of common sense, and appreciation of the fact that lubrication of all moving parts must be maintained, and inspection made frequently and periodically. Owing to the high temperatures usually prevalent in economizer housings, and the fact that the lubricants in service are continually exposed to these temperatures as well as to dust, dirt, and possibly atmospheric conditions, their lubricating qualities will naturally deteriorate more rapidly than usual.

Neglect of lubrication of economizer motors, driving gearing, reversing mechanism, chains, shaft bearings, etc. will therefore be productive of serious consequences. Probably the results would be the ultimate burning out of the motor, shaft or engine bearings or production of such excessive wear of the gears and driving chains, that slipping or breaking might occur.

Relative to the grades of lubricants required for economizer operation, usually but three or four types will be necessary. Lubrication of motor bearings, which are generally of ring or chain oiled type, is similar to usual practice for such equipment in general. Normally a

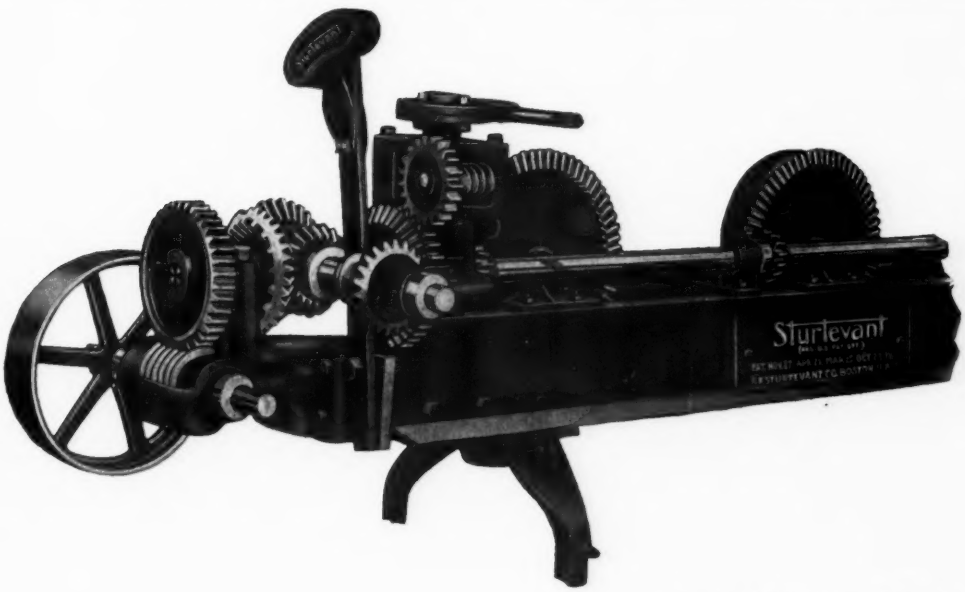
medium viscosity, straight mineral oil of 300″ to 500″ viscosity will satisfactorily meet conditions.

Reversing mechanism gearing, worm, bevel and chain driving gears as the construction may include, can be lubricated with a pure mineral lubricant of 1000″ Saybolt viscosity at 210° Fahr. under ordinary conditions. The requirements are for a relatively stiff bodied lubricant which will spread evenly and stick tenaciously to the wearing surfaces, links and teeth. It should not be so thick as to form in clots where applied, and thus cover but parts of the wearing surfaces, nor to be thrown off by centrifugal force during operation. On the other hand it should be thick enough to insure against loss from dripping.

Bearings of chain sheaves can be lubricated by grease cups or simply oiled by hand, whichever the installation is designed for. Such bearings are relatively small, built with no mechanical means of lubrication, and subject only to very slow shaft speeds. Grease for such lubrication need not possess a high melting point, for though the temperature may rise to perhaps 150° in an enclosed housing, it will never be so great as to liquify an ordinary cup grease excessively.

When the apparatus is built for hand oiling the lubricant can be the same as used on the motor bearings. Reversing lever fulcrum and other miscellaneous bearings for driving shafts, etc. can be similarly lubricated by hand periodically at each inspection by the operator.

Typical constructions may differ somewhat in regard to the manner of driving the scraper mechanism. Belt drives usually involve fewer complications than do chain drives from a single motor, especially where considerable shafting and individual chain drives therefrom are concerned.



Courtesy of B. F. Sturtevant Company

Fig. 1.—Typical Economizer Scraper Operating Gearing, Belt Driven. By virtue of this mechanism the scrapers are moved up and down the pipes, acting positively to keep the latter clean of soot which drops to the bottom of the economizer. It is clearly seen that on such exposed gearing, lubrication is an important factor, and periodic inspection and cleaning should be done to insure against accumulation of excessive dust or dirt.

Where the installation is designed for forced or induced draft, the lubrication of the draft fan and its driving engine will also require consideration. Fan bearings in such installations are generally water cooled and lubrication of same develops no special difficulties beyond the possible transmission of considerable heat via the motor. To meet this condition the lubricant should be fairly heavy in body, i.e., about 500″ at 100° F. on the Saybolt viscosimeter. Such bearings are usually of the ring or chain oiling type.

The driving engine for the fan is generally a simple steam driven, single cylinder, horizontal

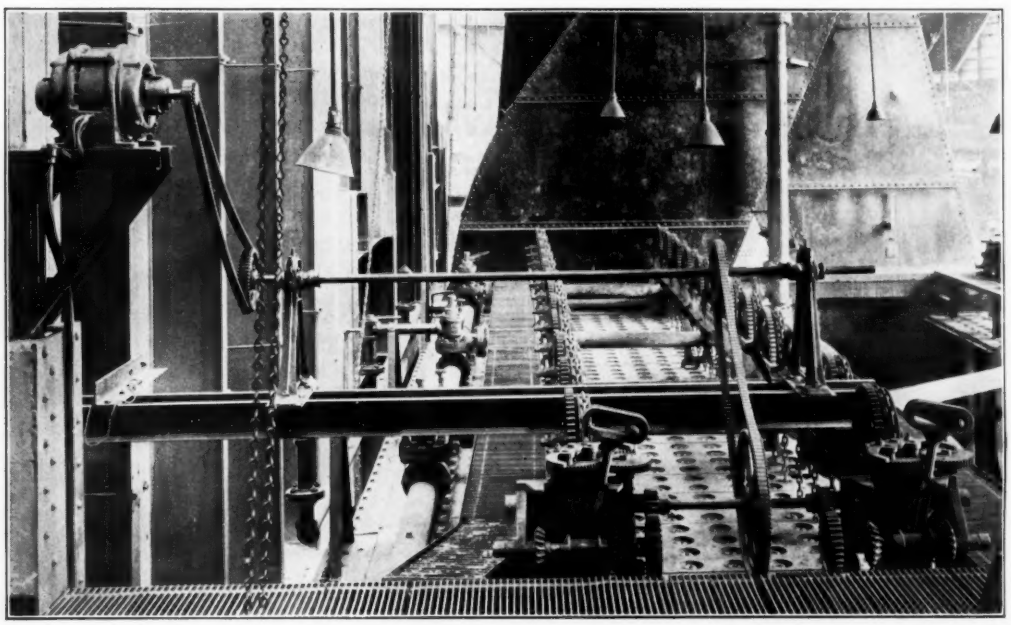
reciprocating engine. Normally it will be subject to the same temperature conditions as the other mechanisms considered heretofore. Lubrication of the steam cylinder, valves, etc. will usually be a problem of dealing with wet steam of perhaps 1% to 2% quality. In such a case the lubricant to use should be a cylinder oil compounded with sufficient fatty compound to effectually produce the required emulsion and stickiness in the oil when in contact with wet steam.

Lubrication of the other engine mechanisms such as crankpin, wristpin, crosshead guide, etc. can be best carried out by using a straight mineral oil of about 300″ viscosity. The same oil as used for motor bearings will usually meet the requirements very satisfactorily.

Vertical steam engines for draft fan drive involve no particular lubricating peculiarities other than stated for horizontal engines, and the lubricants to use for each part would be the same.

Engine lubricants will usually require hand application, via the use of hydrostatic steam cylinder lubricators attached to the steam pipe; and sight feed oil cups attached to pin bearings and guides.

Where the draft fan is driven by motor the lubrication factor becomes simply that of using the proper oil in the oil wells of the motor bearings. The conditions will be very similar to those under which the scraper driving motor operates. Hence the same oil can be used satisfactorily.



Courtesy of The Green Fuel Economizer Company

Fig. 2.—Top View of an Economizer Installation connected to a 1,200 H. P. Babcock & Wilcox Boiler, operated at 400% of rating. Motor driving mechanism and chain connections are clearly shown, as well as patent reversing device which automatically reverses the direction in which the scrapers travel when they reach the top and bottom of the tubes. Surroundings detrimental to efficient lubrication are evident due to excessive heat, dust, etc.

Conclusion

From the foregoing it is thus seen that lubrication of economizer equipment is an important feature, and it will behoove the Plant Engineer to insist that his boiler house operators fully understand this and carry out rigidly the necessary routine of inspection of oil cups, oil well gauges, cylinder lubricators, etc., filling same promptly when necessary, applying oil by hand at regular frequent intervals to such parts as require same, and correcting defects in lubricating equipment promptly. It is not so much a question of a lot of oil, as of a little oil properly applied, which will insure the life of the equipment, and preclude shut-downs which may mean a marked loss in plant production.

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IN THE BOILER HOUSE

BOILER house auxiliaries are, for the most part, located in places difficult of access. Which is another way of saying "Hard to reach with an oil can." And, therefore, because human nature is what it is, it behooves the Plant Engineer to keep a weather eye on such lubrication as is required in this department.

He will do well to lay out a careful system of inspection and lubrication and to insist on its rigid enforcement.

And further, as we have frequently pointed out, auxiliaries require high quality lubricants, in order to do their work right.

As the efficiency of Economizers will affect the efficiency of the entire plant, it is almost unnecessary to point out that Economizers merit the best attention and the best lubricants you can give them.

Accordingly, we have prepared a list of Texaco Lubricants, which are entirely adequate and perfectly suited for this service.

TEXACO LUBRICANTS FOR ECONOMIZERS

Motor Bearings	Texaco Aleph Oil or Altair Oil
Draft Fan Bearings	Texaco Altair Oil
Reversing Mechanism, and gearing such as worm, bevel or chain driving gears	Texaco Crater Compound No. 1
Scraper Chain Sheaves	Texaco Aleph Oil or Altair Oil, (or where grease lubrication is allowed for) Texaco No. 1 Cup Grease
Accessory Steam Engines, steam cylinders	Texaco Draco Cylinder Oil or Pinnacle Cylinder Oil
Miscellaneous External Lubrication	Texaco Aleph Oil or Altair Oil

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